

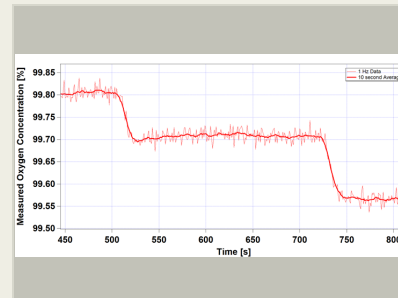
Highly Accurate Sensor for High-Purity Oxygen Determination, Phase II

Completed Technology Project (2012 - 2017)



Project Introduction

In this STTR effort, Los Gatos Research (LGR) and the University of Wisconsin (UW) propose to develop a highly-accurate sensor for high-purity oxygen determination. The analyzer, which is based on LGR's patented Off-Axis ICOS technique, will be capable of rapidly quantifying high-purity oxygen (95 – 100 %) with very high accuracy (better than ± 0.03 %), minimal calibration, and no zero drift. Moreover, the sensor will require no consumables and be sufficiently compact and robust for deployment aboard the International Space Station (ISS). In Phase I, LGR and UW successfully demonstrated technical feasibility by fabricating a prototype that quantified high-purity oxygen with a precision of ± 0.017 % and a 24-hour drift of less than 0.05 %. The analyzer distinguished a 0.1 % change in highly pure oxygen and provided a linear response ($R^2 = 0.999997$) over a wide dynamic range (0 – 100 % oxygen). The prototype was found to be accurate to 0.07 % by testing it at NASA Johnson Space Center on oxygen purified by the Cabin Air Separator for EVA Oxygen (CASEO) project. Due to the success of this program, LGR released a commercial O₂/CO₂ analyzer for environmental applications. In Phase II, LGR and UW will refine the measurement strategy, miniaturize the hardware, ruggedize the analyzer, and test the resulting instrument. The measurement strategy will be improved to reduce long-term drift and extended to include other species (H₂O, O₂ isotopes, N₂). The hardware will be modified to meet the technical requirements for deployment aboard the ISS (e.g. power, size, weight, and environmental specifications). The prototype will be manufactured and tested to empirically determine its accuracy, precision, linearity, long-term drift, and time response. Finally, the Phase II instrument will be delivered to researchers in the Life Support and Habitability Systems Branch at NASA Johnson Space Centers for characterization of high-purity oxygen generators.



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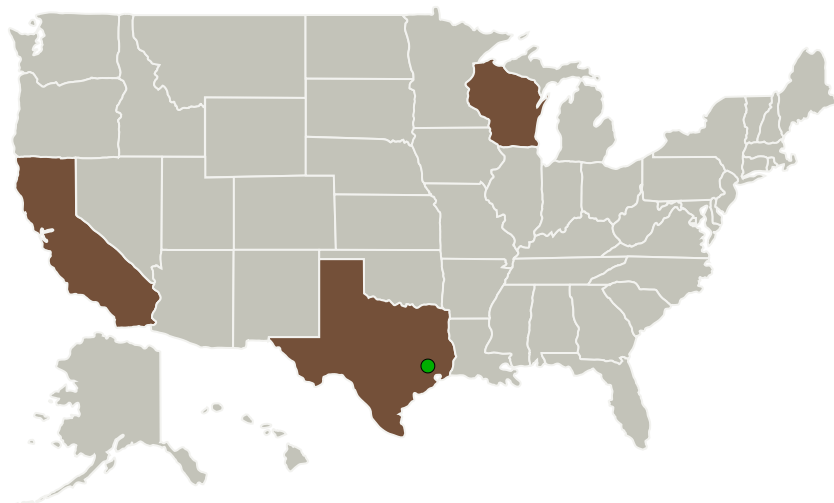
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Los Gatos Research	Lead Organization	Industry	Mountain View, California
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas
University of Wisconsin-Madison	Supporting Organization	Academia	Madison, Wisconsin

Primary U.S. Work Locations

California	Texas
Wisconsin	

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Los Gatos Research

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Manish Gupta

Co-Investigator:

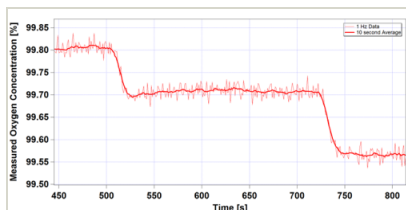
Manish Gupta

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Images



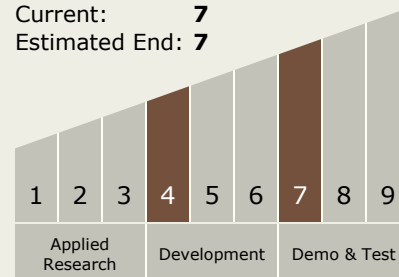
Briefing Chart Image

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(<https://techport.nasa.gov/image/133167>)

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - TX06.5 Radiation
 - TX06.5.3 Protection Systems

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System